A methodology and tool support for managing business rules in organisations ☆

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Abstract

Business rules are evidently important for organisations as they describe how they are doing business. Their value has also been recognised within the information system (IS) domain, mostly because of their ability to make applications flexible and amenable to change. In this paper, we propose a methodology that helps business people and developers to keep business rules at the business level inline with the rules that are implemented at the system level. In contrast to several existing approaches that primarily focus on business rules in the scope of an application, our methodology addresses the entire IS of an organisation. The paper also describes requirements for a tool support that would be appropriate to support the methodology.
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1. Introduction

In the last decades, business rules have become popular in the information system (IS) community mostly because of their ability to make applications flexible and amenable to change (e.g. [1-7]). Both, researchers and practitioners are convinced that since business rules are very sensitive to business changes they require explicit treatment during IS development to ensure the IS agility. Otherwise many problems may occur. For example

- Since not acquired systematically and completely, business rules do not reflect real conditions of the business environment. Consequently, applications are developed that do not meet business needs.
- There is a lack of documentation on business rules.
- Business rules are buried into program code. It is not clear, what kind of rules govern an application, when the rules are triggered and how they are implemented.

- Business logic is hard to maintain as rules are distributed across the application logic.
- Business rules are hard to control, since there is no common and single purpose store for them.

The aforementioned problems have initiated a lot of research in academia and industry. As a result, a variety of tools and approaches can be found today that provide IS developers with facilities for managing business rules in IS development [8-12]. Business rules, however, do not pertain to IS or to its application software. Business rules are set and owned by the business and have to be therefore managed by the business.

In the paper, we emphasise that business rules may not just serve as a mechanism for making applications flexible, but could also be used as a bridge that helps to keep the entire IS of an organisation aligned with its business. As the main contribution, we propose a methodology and requirements for a tool support that facilitates business people and developers with a support for keeping business rules at the business level inline with rules at the system level. The methodology defines all the necessary activities that have to be performed within IS development in order to establish the link between an implementation of a business rule (e.g. *trigger* in database, *method* in program code, etc.) and its sources in business environment. When changes occur at the business level, the methodology and tool assist in finding the applications and their components (no matter what kind of technology they use) that are influenced by the changes.

The paper is organised as follows. Section 2 gives a brief history of business rule related research, discussing contributions from different research areas. In Section 3, we provide a motivation for business rule management in enterprises and give a brief explanation of our research approach. Section 4 proceeds with the discussion on the business rule management process, examining the activities that are required to manage business rules for an overall organisation. In Section 5, the requirements for building an appropriate tool support for the business rule management process are discussed. Finally, a discussion is provided on related work.

2. Background

The roots of business rules come from the Artificial Intelligence community, where they have been successfully applied as a way of representing knowledge. In the *knowledge-based systems*, the knowledge and reasoning of a human expert can be captured and stored in a form of complex networks of rules. The rules are typically described using declarative languages that do not imply order or flow of control. The rules are stored in a *Rule base* and processed in a special component, called *Inference engine*. The inference engine evaluates the conditions of the rules and at any point in time determines which ones are eligible to fire.

Extensive business rule related research could also be found within the Database research community. As a result of this effort *active databases* have emerged [13-17], which, as opposed to passive databases, employ active components such as *triggers* and *database procedures* to perform their own data integrity functions. Another database related research on rules includes *deductive databases* [2,18,19]. While traditional database systems only manage *extensional knowledge* that is embedded in facts and instances, deductive databases add *intentional knowledge*, which is beyond the factual contents of the database. This kind of knowledge can be fully specified with rules and is stored in a rule base before the database is established [20].

Once the idea of implementing business rules in database systems emerged, substantial effort was put into discovering a robust and powerful method for representation of business rules in data models [6,17,21–23]. As opposed to static business rules that can be expressed in Entity-Relationship-Models (ERM), dynamic business rules are not supported, as ERMs do not allow an explicit representation of events, conditions or actions. Consequently, several extensions to the ERM have been proposed (e.g. ER-RM [24] or BIER [25]) as well as other techniques and methods (e.g. ELH of SSADM [26] or the Ross Method [6]). A comparison of selected methods can be found in [21].

As interest in business rules grew, advocates of the approach became aware that an explicit manipulation of business rules was required in